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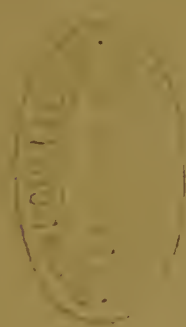
THE
PHILOSOPHY OF VOICE:

SHOWING

THE RIGHT AND WRONG ACTION OF VOICE IN
SPEECH AND SONG.

By CHARLES LUNN.

“Before you can possibly be safe in dealing with Nature, you must get two or three kinds of cross proofs, so as to make sure not only that your hypothesis fits that particular set of facts, but that it is not contradicted by some other set of facts which is just as clear and certain.”—*Huxley*.



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TO
THE MEMBERS OF THE MEDICAL PROFESSION,

A PROFESSION IN WHICH SELF-ABNEGATION AND SCIENTIFIC

RESEARCH HAVE EVER REIGNED SUPREME,

This Essay,

WITH EVERY FEELING OF ADMIRATION, IS RESPECTFULLY

DEDICATED.

PREFACE.

THE following pages are a reprint of several papers published in the *Medical Press and Circular* with a view of explaining the differences which are found between the statements of musicians and physiologists, and are intended to place voice culture in its true position as a branch of surgical, rather than as a branch of musical art. The proposition of placing voice training into the hands of a different class of men to that which hitherto has held it with unchallenged authority may in the onset create dismay, and from the thoughtless members of the musical profession generate opposition ; but the proposal is Entirely Beneficial, and is not, as at first sight may appear, detrimental to the profession it seems injuriously to affect. The only effects of such change would be that true vocalists—those who desire not only to be singers, but also artistes, and who, therefore, require instruction both complete and profound—would be temporarily withdrawn from musical teachers only

to return after a time and add renewed and enhanced lustre to the beautiful art of song. Indeed, until musicians themselves insist upon isolating the three branches forming the complex art called singing, excellence will always remain an exceptional thing, forcing itself in spite of, not in consequence of, past training. So far as the art of song is concerned, there should be in each large town three men acting in friendly consort—one whose sole work should be to attend to the substratum and teach the production of true musical sound by the voice, implicitly obedient to the will of the possessor; a second—a musician proper—who should teach, on stern scientific principles, laws of æsthetics, or the arranging of present pleasurable impressions associated relatively for a predetermined end;* while the third and last should take these persons so developed and so taught and teach them the art of rightly associating words with accepted musical impressions, so that each appeal to the listener should be perfect of its kind, while neither appeal conflicts with the action of the other. This may appear Utopian: with that I have little to do; it has rested with me to see that at least my branch of art-work should no longer be overclouded with Error and her attendant Failure. So far as voice training is

* See Sully on "The Possibility of a Science of Æsthetics."

concerned, it has for years been calmly assumed that the majority of people are naturally created defective, and that a master can do what Nature herself has failed in doing. Monstrous, incredible, and impious assertion ! This, on the contrary, is the truth : All error and weakness, and all defect in tone, each and all of these are *induced*, and can therefore be *removed*. But, passing the after-application of voice training for the specific end of song, note how many, note how the majority, even, of public speakers, fail, not on account of intellectual, but entirely owing to physical incapacity ; all this could be averted by establishing at each University a Professorship of Voice Production, thus, by rightly-directed work, could be imparted to our future clergy, statesmen, and lawyers a perfect power to display their thoughts through spoken words uttered with enduring force and masterful control of tone. This at some future time will doubtless be done.

In most treatises on the voice the writers have confusedly mixed up the science of physiology with the surgical process of voice restoration ; thus, they have adorned their works with numerous diagrams extracted from physiological works : as all such diagrams tend only to confuse, it has been my endeavour to avoid this fault, and to argue on purely abstract principles. And now, little work, go on your mission : that you will meet with opposition—as all advanced thought

invariably does—is to be expected ; but there are more persons interested in truth than ever there are in its destruction, so to the bar of public opinion I appeal, confident in the ultimate acceptance of what I hercin proclaim as true, and confident, too, that these truths are capable of conferring great—of conferring very great benefit, not only upon musical art, not only upon public orators, but, above all, upon the suffering and the enfeebled, whose debilitated health might be strengthened, and chest disease swept in great part from our shores.

CHARLES LUNN.

EDGBASTON, NEAR BIRMINGHAM.

THE PHILOSOPHY OF VOICE.

THE present age is essentially one of revision and research; no longer are the accepted notions of bygone times taken as granted, but sufficient proof is required that what has been advanced on any given thing has borne the scrutiny of science, and has been weighed in the cold scale of logic. Of late years a part of the artistic world has been trying to teach the members of the medical profession, and through them others, the science underlying the art of voice production; and the reproduction in the *Medical Press and Circular* of Signor Garcia's observations, taken in connection with a lecture delivered at University College, and reported in the *Lancet* of February, 1873, naturally challenge the attention of all lovers of truth in Nature and rightness in human work. If the statements made by Signor Garcia and others be true, one of three things is sure: 1. Either the accepted laws of natural philosophy are unreliable; or, 2. All the observations made during dissection have been made by careless observers, and all the experimenters upon the detached larynx have been ignorant

men; or, 3. Failing these, the theories held by those who profess to teach us are false. Then, in the face of the grave implications conveyed by the erroneous statements made by musical men, it is right that we should reconsider the whole question of human vocal tone from its commencement, so that discrepancies may be accounted for, erroneous notions combated, and learned ideas obtained in place of the vulgar ideas which at present prevail. As we cannot admit error in accepted laws of science, the real point at issue rests between the medical and musical professions; one or the other is wrong. It shall be shown that the latter is—that the fallacies held by Signor Garcia,* Madame Seiler, and others arise naturally from their reasoning being solely deductive, never inductive, and that the influence of their art tends to destroy accuracy of statement. First, then, the difference between the two professions. Medical men are essentially scientific, their very profession is based on science, and that science is a never-ending one, inasmuch as it is founded on evil influence opposing human perfecture; men of art, on the other hand, require range, not depth; their power lies in conception and imagination, while the former, in common with all scientific men, have their power in perception and penetration. Men of art evoke what is not, men of science see what is. Art-product results from seeing many things

* It is to be observed that so far as teaching power is concerned the errors of Signor Garcia do in no way affect for evil his results; his results are true, but his explanation of the processes by which such results are obtained are, in part, false.

together superficially, but science teaches men to see one thing profoundly and well. Then, when men of art step into the alien field of science, the hypotheses advanced are always suspicious, always liable to be overshadowed by the changing clouds of artistic feeling.

It is time all discrepancies between the conclusions of one class of men and those of another were swept away, so it shall be shown that second causes have been confused with first, inducing illogical conclusions untenable by men of science ; it shall be shown that great as the discovery of the laryngoscope was, the sole use of this instrument, after satisfying the curious, is to detect disease, to guide the surgeon's eye and hand, and that its introduction into the musical profession as a teaching power will destroy the sole relic of a once great school of song, raising in its stead a pseudo-science, at which wise men may smile, but before which the thoughtless, the ignorant, and the unwary will fall unconscious victims. Moreover, the importance that all error should at once be crushed will become more apparent when we consider the constant demand for larger edifices and the paucity of orators and public speakers capable of filling by voice such buildings as at present exist. Voice training has become an inferior adjunct to music. Thus, the delegates of the Clarendon Press, as final strength of tuition, have issued for the guidance of England's embryo preachers a work by a musician, which asserts "there is no necessity for seeking any power of altering the quality of the notes in the larynx itself." ("The Cultivation of the Speaking Voice.")

We will take the embedded article of May 28th, 1873,

and the report of the lecture, February 8th, as the views expressed to us by those artists who have made inroads into science, and we will take Signor Garcia's "Singing Tutor" and Madame Seiler's "The Voice in Singing," as the elaboration of such views to their fellow artists. (The lecture at University College was but an echo second-hand of Madame Seiler's errors, so her printed words are responsible.) Against these we will take the observations made by Dr. Wyllie, of Edinburgh, and such conclusions as common sense, unprejudiced and unhampered by art-instincts, may suggest. We have to test our teachers on two points:—1. Their explanations of natural phenomena; 2. Their method of procedure for the attainment of a desired result.

I extract the following from Signor Garcia's work:—

"Let us here observe that three registers of voice are generally admitted—chest, falsetto, and head. The first begins lower in a man's voice than in a woman's; *the second extends equally in both voices*; the third reaches higher in the female voice."

And this from the *Lancet* report:—

"In speaking of the compass of voices, the lecturer remarked that by many it is erroneously imagined that the female voice is simply a reproduction of the male voice on higher scale. The fact is, that the two overlap [converge] the break between the chest and falsetto registers, occurring exactly at the same pitch, *i.e.*, on, or just above F in the first space of the treble staff."

Let this be well understood: it is asserted that the male chest register necessarily has a greater number of notes in it than the female, for while this latter can

never go as deep as the former, the former can extend as high as the latter ; in other words, representing notes numerically, say from one to thirty, one being the lowest, a male chest register may embrace from one to sixteen inclusive ; a female can only embrace from nine to sixteen : thus, this part of the female voice must be eight notes less in compass than the male, and *may* be more : that is the theory held by all musicians. Taking the elaboration of this abstract theorem we find in Signor Garcia's 'Singing Tutor' as follows : He gives to the contralto—the lowest female voice—a compass of from low F to the G on second line of violin staff ; to the medium—mezzo-soprano—from low A to F sharp ; and to the highest female voice—soprano—from B to E. To male voices, bass from lowest E to upper D ; baritone from B flat to upper F ; and tenor from D to top A. Granting Signor Garcia's statement, " this register of the chest is the essential base of all voices ;" we will place the compass given by him to each, arranged according to the highest limit given : We have bass to D, soprano to E, baritone to F, mezzo-soprano to F sharp, contralto to G, and tenor to A.

It is seen the bass ascends to D, baritone to F, tenor to A—a natural difference enough, as these voices are rightly considered a third apart in pitch ; but for the female we have E for the highest voice, F sharp for the medium, and G for the lowest, so that according to this arrangement the chest register extends in altitude *transversely* to the recognised pitch of each voice. But this is not all ; it will be seen that the highest note in pitch of all the notes given is ascribed to the tenor, while the

soprano—the corresponding voice in the female to the tenor in the male—has but one note above the lowest male voice. Again, the extraordinary compass of “chest” voice with which all male voices are accredited, compared with the compass given to the female, must strike the most thoughtless observer.

Madame Seiler, in her work, simply abstracts Garcia’s error, giving a division in the high part of the male voice as corresponding with a like division in the low part of the female ; but, expecting her statements to ultimately conflict with those of the medical profession, she foils the evidence of dissection thus :—“ But in order to render practicable the proper stretching of the excised larynx, muscles and membranes have to be cut, which *sufficiently proves* that the functions of the organ of singing in the living must be *differently* carried on ” (p. 37). Extend this statement and anatomy becomes valueless. In point of fact, nothing of the kind is thereby proved, but the exact opposite is suggested—namely, that the functions of the organ of singing are presumably similarly carried on, but better, more perfect, and more extended results would ensue from the living subject than are producible from the dead.

Let us turn to the logical side of the question. Things which are equal to the same are equal to one another. Anatomy teaches us that there is no difference between the male and female larynx save in size, so that actions are the same and results the same, only differing in pitch, the female voice being a reproduction of the male on a higher scale ; and this has been amply proved by experiments made with the detached

larynx. Dr. Wyllie, in his valuable researches, produced what may be called the station note, that is, the note of sole approximation without tension or relaxation, G second line treble clef from a female, and E third space bass clef from a male larynx; ten notes apart. By slackening tension, each larynx could produce sounds eight notes below the station note; by increased tension and increased blast, ten pure notes above the station note were produced, upwards of two octaves of full vibrations, the female extending by the same mode of production one octave above the male. If in death such results can be obtained, greater, not lesser results would ensue from similar things in life. For the sake of convenience we may accept our teacher's definitions, and call that "chest" or "thick" register, which is produced by full vibrations; "falsetto," or "thin" register, that which is produced by solely vibrations on the rim; and "head," or "small" register, that which results from a "node;" and we may accept Signor Garcia's definition of a register as being "a series of consecutive and homogeneous sounds, rising from the grave to the acute, produced by the development of the same mechanical principle, the nature of which essentially differs from any other series of sounds equally consecutive and homogeneous produced by another mechanical principle." It is an aphorism in natural physics that there is no effect without a cause, and, if, as alleged, the female voice be not a reproduction of the male, there must exist a difference of construction besides that of size, which difference all anatomists in all time have on dissection failed to perceive. The *onus probandi* rests with our would-be teachers;

they assert a difference: we demand proof that such exists. But more, identity in production is denied by writers on voice, yet univocal laws are deduced from one sex as affecting both. "We will study in the voice of the tenor the ascending progression of the chest register, and in the soprano, that of the falsetto and head registers." (Garcia.) Then either it is wrong to deny coincidence of production, or it is wrong to generalise the sexes; this dilemma sufficiently shows that the inroads to science have not been deep, and that the dogmas advanced are either fallacious or premature.

Again, we are asked to believe that the "falsetto," or those sounds which result from a vibratory rim, are identical in altitude and similar in limitation, while the instruments producing these sounds differ materially in size. Finally, we are asked to believe that the power of forming a "node" (head register) is *denied* to most men, owing to an *absence* of the cuneiform cartilages ("Voice in Singing," p. 61). We ask the cause of these discrepancies: it is futile to account for the errors by saying, "it is seen as explained," because we call attention to the fact, that of a number of notes of equal pitch and apparently similar productions, one alone may be accurate and possess true musical sound by the voice, and that such note can scarcely be diagnosed by the laryngoscope. "Garcia says himself that one-third of the glottis was always hidden from him by the epiglottis, and to this circumstance is the unsatisfactory character of his observations to be ascribed. But even when, after long practice, one is able at last to bring the whole glottis into view, this is not by any means enough. Not until

observation has been so long continued that all the movements of the vocal organ are normal, notwithstanding the *unnatural* drawing back of the epiglottis, and not until the process that goes on is found again and again to be always the same, can it be recognised as fact." ("Voice in Singing," p. 40.)

To this we object; the experimenter could not possibly know, under such contortions, that the vocal organs were acting in their "normal" state, and in order to render practicable the desired observance of the instrument during the emission of sound, muscles and membranes had, by "long practice," to be distorted, which sufficiently proves that the functions of the organ of singing, when accurately emitting tone, are *differently* carried on. But—jesting apart—to diagnose an ugly, unmusical tone, that being falsely produced, is readily "found to be too fatiguing," and therefrom deducing fixed laws is about as sensible as taking a cripple to represent the human race in its most perfect state, and deducing physical laws from his distorted state. The laryngoscope is an invaluable surgical instrument; but unless the better sense of the musical profession prevails, singing masters will stand a chance of being hoisted from their own petard.

As in death so in life; there are two octaves of full vibrations natural to all voices. These two octaves, if in the male, are usually classed under one term—"chest;" while in the female they are always classed under two, and sometimes under three terms. This confusion has arisen owing to persons mistaking re-enforcement for generation; Madame Seiler has gone even further, and sub-divided the voice.

Then there is the "falsetto," which does not extend equally in pitch in both voices, but extends collaterally, with the greater part of the full vibration : this is, as its name implies, a false production ; it is created by the air in passing causing the edges only of the vocal cord to vibrate, on account of the cords being insufficiently approximated. In point of fact, this production is a partial catching of the air in transit, and has not what may be termed the "tonicity" of voice, consequently it is not capable of any great variableness in intensity. Then there is the harmonic, or "node," which weakly people and persons of small thoracic power substitute for about the last five notes of the full vibration. This results from skill, and not from the possession of a superfluous cartilage ; but it may be observed, excellence in one method of production usually involves defeat in the other, so that vocalists select one or the other mode of production and retain their special way. The singular thing, however, is this, that while the high A of Mr. Reeves, the high G of Mr. Santley, interpolated in "Oh, ruddier than the Cherry," and the high B flat of Mdlle. Titiens in "La Dove Prende" are all identical in method of production, they are called respectively male "chest" and female "head," while the full vibrations of Mdlle. Titiens and the harmonics of Madame Sherrington differ in production, but are classified by masters under one term.

Such errors of statement arise from a confusion between first and second causes. This is readily shown. Any difference which is observed to exist between the results obtained from the larynx attached and when

detached must be owing to the different conditions under which observations are made; as we cannot accept a difference in the generating cause of voice, any apparent antagonism between hue tinging created sound in man, as contrasted with that of woman, must be traced to auxiliary influences, for Dr. Wyllie says : "In my own experiments I found very little difference could be observed between the sound of the male and the female larynx, farther than the fact that the voice of the former was set several notes lower than that of the latter. The absence of the peculiar characteristics in both cases I ascribed to the removal of the pharynx and the other parts of the vocal tube." We know air imprisoned will re-enforce sound created elsewhere; thus a difference in thoracic form necessarily throws an influencing power on the tone derived from the intrinsic nature of the vocal cords. For obstetric reasons the breathing of woman is pectoral, while that of man is abdominal; owing to this deeper breathing on the part of man, the whole scale of man's tones, when under full vibration, is tinged by this under re-enforcement, but this under-tone soon ceases in woman—it ceases when the larynx by its assent, has caused the plane of the vocal cords to assume a position so diagonal that the full force of tone is thrown forward into the arc of the mouth. The deeper breathing, then, in man, accounts for the first fallacy of singing-masters, and sweeps away the apparent discrepancy between the results attained by experimenters and the exemplifications presented by our songsters, and also accounts for the extraordinary assertions made by our teachers respecting the male as

contrasted with the female "chest." Consequently it may safely be predicated that the vocal cords are subject to the same natural laws as all sounding bodies, and as the sole difference between the male and female larynx is one of size alone, the voice from the latter is a reproduction of the former on a higher scale.

Madame Seiler attempts to support the fallacy held by voice trainers thus: "As the male larynx is about a third larger than the female, it is plain that the registers in the male voice have a greater expansion" (p. 67). This is false, the expansion would be exactly similar; the writer evidently deduced a conclusion from excess in length, irrespective of additional breadth and thickness. The difference between the male and female larynx is uniform, thus *greater* change of state would be required of the larger larynx to produce a *similar* result to that obtained from the less. Of course, a slight modification of expansion might arise from some little difference in the intensity of attractive force, but this would be an individual, not a sexual difference, and might exist in cords of similar length, and one would be likely to attribute greater elasticity to members of the more delicately organised sex; this, however, is inadmissible in laying down abstract principles.

For us to obtain a true theory of vocal emission the conclusions arising from different aspects of observance must be made to coalesce. First, as a scientific basis, we have the observations of the anatomist, who has pointed out, irrespective of results, what the instrument is. Secondly, we have what he has gained from the instrument acting by itself, as he imagines, in accordance

with natural laws. Thirdly, we have a number of hypotheses, more or less tenable, deduced from the complex results obtained from the instrument acting in connection with other influencing causes. Of these hypotheses, some have been deduced from the instrument acting in strict accordance to Nature, others, as in the case of all laryngoscopic observation, from the instrument more or less distorted.

Now, the voice trainer has to reinstate a control incidental to Nature, which control, as shall be shown, has become weakened by the association of articulative speech with vocal utterance, causing (1) a horizontal, and (2) a perpendicular weakness—purely a physical disadjustment, in effect causing the sound to be feeble, dead, and only partially responsive to the will.

Sound is air in motion obstructed, or air stationary put into motion by an elastic substance. Noise is either a single disturbance of air or conflicting disturbances; pleasurable sound is the result of successive and equiformed disturbances; thus, a noise arising from a single disturbance may only want *continuity* to transform it from offensive into agreeable sound. Where sound results from air resisted forcing itself through a fissure, that sound cannot be musical unless the fissure be symmetrical, that is unless it be divisible by two straight lines at right angles into four equal parts. Without going deeply into the acoustical part of the question, it may be stated musical sound is compounded of clearness, smoothness, volume, and intensity. In air passing through a fixed fissure, clearness results from the smallness of the fissure, smoothness from its form, intensity

from the force of blast resisted, and volume from air imprisoned in a cavern, to which the fissure is the entrance or exit. (Of course, there is consensual vibration in all the parts surrounding the organ of voice, but the science of voice production has not to do with this.) In a vibratory material, the clearness, the basis of the clang-tint, results from the intrinsic nature of the thing; the smoothness from unimpeded swing; and the intensity is owing to the width or amplitude of swing; while the volume results from re-enforcement from attached parts. A vibratory tuning-fork placed on a table has its sound so strengthened thereby that a child judging by sense of hearing alone would ascribe the sound to the table; vibratory laminae placed above air imprisoned in the chest have sound so strengthened that many ascribe the sound to the chest itself—hence the term “chest” register. Thus much for generalities; now for particulars.

As the late John Stuart Mill pointed out, all that we do is dependent upon resistance; there is a resistance acquired, and there is a resistance incidental to our being; there is a resistance permanent, and another temporal. In all our relationships with the world without, our control is an acquired knowledge of forces acting in opposition; this knowledge results from numerous past experiences, and has grown with our growth. In our own construction there are forces placed in opposition, so that, when in a state of repose, muscles are not inert and flaccid, but balance each other; this condition is what we term “tonicity.” With the

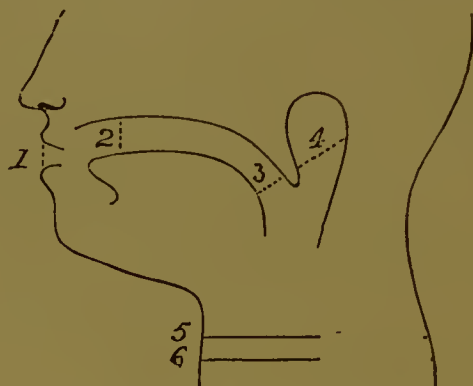
organ of voice, there is an exactly similar condition, and this may be termed "the tonicity of voice." This condition is volitional; under it the wind and reed synchronise, and the pressure and resistance become equipoised, save a small yielding surface presented by the vocal cords. We have, then, to consider our two forces—air in motion (breath) and the elastic obstruction. The following synopsis of our motory power will settle one part of the business :—

Immovable.	Residual Air.	120 Cubic Inches.	Immovable
Intraction.	Involuntary {	Supplementary Air	Voluntary {
		130 Cubic Inches	
		Ordinary Inspi- ration	
	Ordinary Expi- ration	26 Cubic Inches	Involuntary {
		Complementary Air	
Voluntary			Propulsion.

As there is no occasion for a public speaker or singer to do the work himself, when the involuntary contractile thoracic force will do it for him, it may be laid down as a Universal Axiom that Complete Inflation is the first condition of true use of the organ of sound.

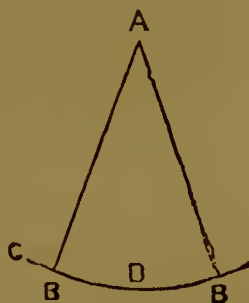
Next, for resistance—that is, the principle by which a fluid may be imprisoned: this necessitates a short investigation of speech; it will be seen that Nature's law is one, and that a simple one; and that however

complex language may appear, it is reducible to a few fundamental principles.



The first place where air can be resisted is at 1. This resistance results from a partial action of the sphincter muscle of the mouth, aided by cohesion of the smooth surfaces brought into contact. By ceasing to will to hold, an explosion of the condensed air takes place, in result the letter *p*. By holding with the tongue at 2, the air is imprisoned and condensed behind; ceasing to will to hold an explosion takes place called *t*. In ordinary expiration, the breath escapes either through the greater passage terminating at the mouth, the column of air in motion impinging on the soft palate and elevating it so that air cannot pass through the nares, or it escapes through at 4, and thus acts by the nose. By holding breath at 3 and 4 both passages are blocked, the uvula acting directly in this, occupying the indentation at the base of the tongue, and thereby aiding the resistance; by ceasing to will to hold an explosion takes place called *k*. These consonants, *p*, *t*, and *k*, may be termed simple complete obstructives—one a labial,

one an arco-palatal, and one a faucial obstructive. The principle in each is one, an act of the will acting in different localities, and causing, owing to the nature of the obstructing force, one explosion of condensed air, in effect noise. The difference in result is not owing to difference of principle, but difference of locality in the application of the principle. By going lower down still to 5 and 6, we come to vocal utterance as contrasted with whispered articulation—that is, we find the same power of obstruction, but which, if rightly released, causes a continuous vibration; in effect, true musical sound. The action of this part we have to settle. It is better, if possible, to illustrate by abstraction, as physiological sketches are useless for teaching purposes to the living subject, and indeed are confusing rather than aidful, so here is an abstraction of the horizontal force supplied at the glottis.



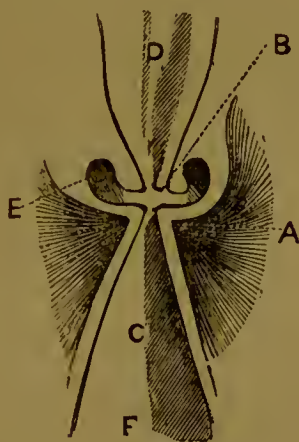
Let AB, AB', be two straight lines revolving on the axis A, and describing the segment of the circle C. Let the enclosed triangle represent space through which the air in breathing passes. If we suppose an equally diffused force propelling a fluid through the fissure,

C

the fluid would escape the most rapidly where the two straight lines are at their greatest disjunction, this escape would be unequal along the whole plane of the fissure, increasing in an equal ratio to the increased size. This inequality of escape would be less or greater, according as BB' are attracted to the point D or repelled from it. Now, it is clear that a fissure having two sides greater than a third cannot be divided into the required four equal parts unless a point be made at D corresponding to the fixed point at A. If this be done, the apices being equal, the lines AB, AB' would assume a parallel position. Supposing these lines to represent the boundaries of an elastic substance, they would, under aërial pressure, alternate between parallel lines and ellipses, thereby making the escape of the fluid through the fissure relative and equal, *i. e.*, beautiful as a sensation called sound. Dr. William Marcet, in his "Clinical Notes on Diseases of the Larynx," thus clearly expresses the action: "When air is blown into the windpipe, it must force its way through the vocal cords, and by so doing cause them to bulge outwards; but the air, now finding a freer exit, and the pressure being relieved, the cords, from their elasticity, will immediately resume their former position. At the same instant the blast, meeting afresh with resistance, will again move the parts aside, and by that repeated action the current of air will be divided into a number of (equal) sections, reaching the ear in a succession of waves, and thereby producing a vibration, perceived as a sound." Such are the conditions for true musical sound by the voice, but there are two forces at work for

evil to prevent right action ; one derived from the association which has grown up between the nerve currents ruling the different positions of obstruction ; the other, owing to the use of vocal utterance as a secondary thing upon which articulation has been superposed, and the question is—How to get, in the living subject, this point at D ?

Having considered the action horizontally, we next consider it perpendicularly. The following vertical section of the parts will show the relationship of the perpendicular to the horizontal force. The position of accurate sound is assumed, and the cut, extracted from Dr. Wyllie's Essay, is at a right angle to the plane of the cords.



- A.—True vocal cord.
- B.—False cord.
- C.—Angular approach from thorax.
- D.—Outlet upward.
- E.—Ventricle of Morgagni.

The science of physiology is indebted to Dr. Wyllie

for a true solution of the phenomena which take place in the organ of voice. Before his observations were made upon the detached larynx there was no accepted theory respecting the use of the false cords, nor of those two chambers, the ventricles of Morgagni, yet both ventricles and false cords exercise most important functions in the creation of true sound. Dr. Wyllie, however, by closer observance, has not only corrected Czermak where he has been obscure or false, but what is of greater importance to all public speakers and singers, has also discovered the ruling cause of accurate as contrasted with false vocal emission; his observations and experiments are not only satisfactory to the student of physiology, but are of great practical use to all users of the human voice, for where Czermak has erred, there Garcia has naturally strayed also, and no one but a physiologist and anatomist could correct the errors of these men.

In explaining the mechanism that takes place during complete and hermetic closure, Czermak says he observed the following phenomena:—

1st. "The arytenoid cartilages intimately meet at their internal surfaces and processes, and bring the edges of the vocal cords into contact." 2nd. "The superior vocal cords approach the inferior so as to obliterate the ventricles of Morgagni; at the same time they also meet in the median line." And S. Garcia, extracting from this, says "that during the emission of sound these last (the ventricles) scarcely retain a trace of their opening. We may say of these cavities that they only afford to the two pair of ligaments a space in which they may easily arrange themselves" (*Medical*

Press and Circular, p. 466). But Dr. Wyllie goes to prove a far different action; he says that his observations do not agree with those of Czermak when this latter asserts that the superior cords approach the inferior ones so as to *obliterate* the ventricles; and Dr. Wyllie adds, "Any observation with the laryngoscope regarding the condition of these ventricles is extremely liable to fallacy, for their oblong orifices are situated in the lateral walls of the larynx and look inwards, so that observing them from above it is almost impossible to tell whether they are open or closed." It is singular that in all experiments, both on living and on dead, the most important point seems to have been overlooked, and that is that there is beautiful as well as ugly vocal tone, that beautiful sound is the natural result of true adjustment of an instrument over which the orator or singer has absolute control, while ugly sound is but a crippled result of solely a partial control. There have never been any attempts to accurately define wherein the difference lies between a true and false use of the human instrument of sound, nor has anyone tried to show the induction of error, and trace its corrective study. We will do this.

The cavity of the larynx above the false cords and the cavity leading from the trachea to the true cords are wedge-shaped, each inverted to the other; when the cords are approximated "the upper surfaces of the true vocal ligaments present a broad flattened plane slightly hollowed out on each side, but on their tracheal aspect the mucous membrane is observed to fall away obliquely downwards and outwards, thus leaving an angle

of considerable size, which forms the margin of each vocal ligament. The same obliquity is observed in the mucous membrane above the false cords, while their lower margins are defined by the ventricles of Morgagni, well-marked pouches which extend upwards behind them about half an inch. . . . Now, it is to be borne in mind that by closure of the glottis complete stoppage is effected, not only of inspiration, but also of expiration, the most powerful efforts at either being rendered quite ineffectual. This is, no doubt, in a sense due to the action of those intrinsic muscles of the larynx which close the rima, but the strength of these comparatively minute structures is surely in itself inadequate to resist the enormous power which the air may be made to exert upon the glottis from within, during a forcible attempt at expiration, as well as its pressure from without when we try to inspire.* From this consideration one is naturally led to suspect the existence in the glottis of some well-adapted valvular arrangements, suited to control both the entrance and exit of the air" (Wyllie). And in experiments analogous to expiration, Dr. Wyllie says that all attempts to stop the current of air by bringing the true cords into contact were futile, and "no manner of adjusting

* Dr. Hutchinson gives as the result of experiments upon the dead subject 580 lbs. as the total pressure over the surface of the chest, reckoning an area of 206 cubic inches, and adds, that as during life much more air could be used, "there can be little doubt (judging from the rapid ratio in which the elastic force increases when the distension is approaching its limit) that the muscular power to overcome this, towards the close of a very deep inspiration, could not have been less than 1,000 lbs."

the cartilages would completely obstruct the passage of air," which, owing to the form of approach, wedged itself between the vocal ligaments and produced in its escape "a sound which more or less resembled the voice." In inverting the current of air he obtained perfect opposition to its transit by solely approximating the true cords, the air catching on their flat edges making them act just as the valve on a pair of bellows acts, the greater the force downwards the tighter is held the obstruction. On bringing together the false cords the closure was found to be complete; the simple coaptation of their free edges proved sufficient to obstruct entirely the full force of air from below. This arises from the air in the ventricles creating an influence upwards and forwards. "The conclusion to be derived from these experiments is obvious. There is within the larynx a double valve which is capable of controlling both the exit and entrance of air. The plan found so commonly throughout the body in such strictures, in the aortic and ileo-cæcal orifices, and in the course of the veins, holds good here likewise. In the upper half the resemblance is most obvious. Comparing it with the aortic valve we find the representatives of the sinuses of Valsalva in the well-marked ventricles of Morgagni, whilst the cusps are reproduced in the two folds of mucous membrane, whose free edges are known as the false cords." Dr. Wyllie corroborated his experiments by laryngoscopical examination, rightly used in his case, because the effect he was diagnosing—complete closure—could be noted under this condition; and he sums the whole thus:—

"1. When the glottis is simply closed and no effort is made either to take in breath or to expire, the false cords are separated by a very narrow interval, through which the edges of the true vocal lagaments may be seen in close apposition.

"2. When an effort is made to inspire the superior cords meet in the middle line, so as to leave only a very small triangular opening posteriorly, through which there still may be caught a glimmering of the pale surface of the true ligaments.

"3. When expiration is attempted the false cords are immediately coaptated throughout their whole length, and if the effort made be powerful the parts are observed 'to arch or curve outwards without allowing the air to escape' (Czermak). This swelling out of the mucous membrane at the upper part of the larynx can be due to nothing but the *inflation of the ventricles* of Morgagni beneath."

Thus much for the physiological aspect of the case ; now for the physical. When the parts are at rest these chambers or ventricles are kept in equilibrium (1) by means of the pressure of the air in them ; (2) by the pressure of external muscles, &c. To close up the orifice a change is made in the pressures. This at first diminishes the size of the chambers, and therefore condenses the air in them ; the pressure of this air is consequently increased, and equilibrium no longer subsists ; the increased pressure of air expands the chambers, and there being no resistance at the orifice, the sides of the chambers move, and the result is, that the orifice is closed ; an additional force, of course, here makes its appearance, being a pres-

sure on the chamber at this orifice, but this is counterbalanced by the continuous automatic force from below. This is proved by observations on the living subject when producing accurate musical sounds. On placing the finger on the point of the pomum Adami, holding breath, and compressing the air by putting the expiratory muscles into increased activity, the larynx is felt to rise; this results from the air acting in the ventricles and on the wedged approach to them, and together thereby forcibly carrying up the larynx. The greater the pressure the more the ventricles become inflated, and the greater the inflation the tighter the closure, and the higher the larynx. By feeling sideways with the finger and thumb above the thyroid, and compressing air, the expansion of the ventricles will be most apparent. A successive use of this expansion during singing accounts for the great breadth of larynx which all true tonalists attain; for, by a proper use of the organ of voice, the two flat plates of the thyroid become forced out, and a much less acute angle of approach to the front is obtained. This, however, is anticipating.

Having seen the action of the instrument, we have to see its connection with attainable results—results, be it observed, both musically good and bad. These are partly volitional, partly automatic. At the first cry of life the whole principle of true musical sound by the voice is displayed; there is clearness, volume (allowing for the size of the infant), and intensity, and only continuity, therefore, is wanting to transform such cry into musical sound. It is admitted that life cannot ensue without this cry, or an approximation to it, so we will

trace its origin. This cry is essentially automatic, and is brought about by reflex action of the spinal cord; so it may safely be predicated that while people may be born cripples in other parts they cannot in the parts producing music, for cry they must or never live: hence it follows that all false use, all bad sound, is induced, and can, therefore, be removed, unless the parts become diseased in after years. On the one hand, while reflex action causes the first inhalation of independent life, on the other, owing to the difference in temperature between the circulation of the blood and the temperature of the air introduced, additional reflex force is generated, and a complete closure of the false and true cords results, that is the mechanical process which goes on before the dawn of consciousness. This automatic resistance against the rebound of the respiratory muscles drives the inhaled air into the most remote ramifications of the lungs, and thus furnishes the residual air which, as we know, is immovable, and remains even after death, and could not get there save by such action as the above. If the opposing power were not perfect, we should have no safe guide to prove the existence of an independent life.

Here, then, we find in the release of this obstruction—brought about automatically by sole approximation—the same application of the before-mentioned principle, air condensed and released, this being the basis of all philology. The sound produced by the infant cry would answer to Dr. Wyllie's station note, but, owing to smallness of size, it would be, in the infant, considerably higher in pitch than the station note obtainable

from the adult larynx. Then we add another simple explosive at 5 and 6 (Fig. 1), which explosive, instead of being confined to one impulsive disturbance of the air, has, owing to the nature of things, a power of being sustained, and this sound, resulting from an equal admixture of wind and reed, is the open vowel *a*. The vowel sounds of speech are five only :—

Italian—*i, e, a, o, u.*

The corresponding sounds in English would be *e* ; and for the second *eh*, or the first part of the diphthongal sound given to our first vowel *a* ; for the third, the broad *a*, as in *father* ; for the fourth, the first part of our diphthongal *o* ; and for the fifth *oo*, or the latter part of our *u*.

Professor Max Müller attributes the difference in vowels to the different form of the cavity above the organ of voice, and this, so far as whispered articulation is concerned, is true ; but with full speech other influence is brought to bear—namely, a difference in the proportions of wind and reed. To produce *e* (English) the larynx is higher, and to produce *u* the larynx is lower than it is for the central sound *ah*, so that, assuming equal pitch for each sound, we find for *e* more lateral tension of vocal cords, and less consumption of blast, while for *u* we find less lateral tension, and *à fortiori* greater consumption of air. The intermediate vowel sounds, of course, lean one way or the other. But all these vowel sounds are sometimes automatic, and are uttered under reflex action from a moan to a shriek, according as the direct nerve-current influences the immediate instrument of sound, or the entire body—that

is, according as the feeling experienced be acute or massive; thus we get language as the natural outgrowth of our construction. In this instrument of voice pitch can be made in two independent ways, by tension of cords or by increase of blast. This is readily proved; on pressing backwards at the point of the "Adam's apple," and uttering a sound, when the finger is released the sound elevates itself; on sustaining a sound and giving a blow on the chest the sound momentarily rises in height.

We will now trace the fall of control involving the decline of tone, and then show the means of restoration and the consequent rise of vocal power. This involves definitions. The object of speech is to say what we have to say in the shortest space of time, and speech sacrifices everything to attain this one end; but the object of song is to say that which we have to say in the deepest and intensest mode;* hence this latter appeals to man through all his powers of reception; the former owes its strength to profundity, the latter to amalgamated forces. Now, oratory, that scarce-existing art, unites both speech and song; the orator is a more subtle composer than the musician, while he at the same time uses all the forces of the poet not only to enforce, but also to convince and to persuade, and, joined to all these, he becomes his own executant, thereby showing the masterful control of the singer over the instrument through which he displays his

* "And in their first learning of notes they shall be taught the great purpose of music, which is to say a thing deeply, in the strongest and clearest possible way."—Ruskin, "*Fors Clavigera*."

intellectual power. That oratory should have fallen is the natural result of ignorance in these matters, and that it will continue a rare and accidental thing is equally true, until the false theories of fanciful musicians be rejected, a truer basis supplied by scientific men substituted in their stead, and voice training be recognised as a separate and distinct field of action. Words, as Mr. Carlyle says, are but metaphors; they mean nothing in themselves, but stand for past perceptions, and only possess intrinsic merit according to their power to awaken or remould the relics of the past through which conceptions can be gained; but a beautiful sound of voice appeals direct to the emotions. Mr. Bain very truthfully points out that the contrast between music and speech expresses exactly the same distinction among effects on the ear as a blaze of sunshine and the sight of a watch do among the effects on the eye—one serves for the purpose of immediate enjoyment or emotion; the other is nothing in itself, and derives its value from our intellectual applications. One mode of appeal yields a large measure of distinctive character of emotion; in the other the emotional character is feeble, and its function is to supply the materials of the intelligence. As the orator, added to his intellect and knowledge, must have full control over all emotional effect, and as he cannot have this without perfect control over the voice, we will briefly trace down the fall of vocal tone. Weakening at 1 we obtain *b*; at 2, *d*; at 3, *g*, *hard*. These, losing in power, require a substitute of sound upon which they can be superposed; hence partial approximation at 6 is introduced, and we thus get a series of complex ob-

structives, and the consequent associated nerve-currents through the brain. This principle of substituting for local weakness associated force is still further developed : altering the channel of exit and closing at 1, we get *m*, closing at 2, *n*, and with further development we get the close aspirates, *f* at 1, *s* at 2, and the complex aspirates *v* and *z*, until we ultimately arrive at the acme of unmusicality, expiratory air forced out by volitional pressure and unimpeded in its exit, giving the letter *h*. Hence the letter *h* is the exact polar contrary to true musical sound, for it is made by the uttermost disjunction of the opposing forces A B, A B, (Fig. 2). Physically, in speech, man blocks, crushes, splits, and slides, columns of air in motion. Now as the first principle of language is rapidity, so it follows that to gain this, continuity must be yielded ; hence it follows that to extend a vocabulary according to the ever-increasing wants of civilisation, consonants are called into greater use and vowel sounds are dropped. Coleridge, in his "Table Talk," supposes a language made entirely of consonants ; and now we find such in daily use in our short-hand system, which is solely an extension of the rudimentary principle, rapidity.

So that amongst the people of every nation we find two forces at work, one of development, one of restitution. The scholar is ever seeking for new symbols to express things or states of consciousness, while the man of small intelligence or few demands makes his words subservient to his bodily convenience ; the one adds and sharpens the consonants, the other slurs or drops them, and

works on vowel tones ; and this is the reason why the voices of the lower orders are generally more sonorous than those of the upper. The more developed a nation the fewer inhabitants proportionately use their language absolutely aright, for the language shows the intellect of a nation at its best, and the higher a development the greater the culture required to attain it, and the fewer persons with innate capacities capable of grasping it. Thus, accepting sounds as symbols, we find a natural power differently applied, which, while serving its purpose to the full, does not secure man in its use from substantial error in other equally natural directions. This shows the prospective benevolence of an Almighty Power forming with increased civilisation new spheres of action in which man may find true work. And in further corroboration that the downfall of tone is owing to the indirect daily action of articulate speech, it may be noted that children's voices are clear, musical, and sympathetic ; they have not had sufficient use to cause the loss of relationship between natural pressure and resistance.

Then, to sum up this part, we find with increasing want of words an increasing principle of action throwing the horizontal force which produced vocal sound out of parallel lines, and, as a necessary consequence of this, we find the perpendicular force weakened ; hence, on the principle of natural compensation, we find additional and vicarious force brought from below which, owing to the wedge-shaped approach, aggravates the evil by forcing open the true opposing force. That the English language is an *h*-producing one, anyone reading the

Psalm can readily see ; and, taking the converse, how many Englishmen dare utter loudly a word beginning with a vowel ? If attempted, either it would not be done, or, in spite of the speaker, owing to weakness of the adductor muscles, an aspirate would precede the vowel. Thus the idiosyncrasy of our people's speech is deadness, weakness, and general feebleness. All nations have their national taint induced on the voice by spoken words, but it suffices to show the Anglican taint ; a true voice becomes Cosmopolitan. The case stands thus : As breath is a condition of our life it always goes on independently of us ; but as the utilisation of air in motion is volitional, so we have between absolute disjunction and complete approximation (this latter being the only possible means of true musical sound, as has been shown) all the varying degrees between the two positions ; and the use of articulate speech conjoined with vocal utterance disturbs the normal balance of the latter, which was to be proved.

Mr. Hullah, in his work on "The Speaking Voice," remarks : "One who has frequent occasion to tax his vocal powers more severely than in common conversation, be it in the reading-desk, or the professorial chair, or the platform, or the floor of the House, will eventually do one of two things—fail utterly, or find out a mode of delivery which, even if imperfect, will be better than that of one whose opportunities of exercising his voice are fewer and further apart." In briefer terms, if a man be obliged to make himself heard, he will obtain power in some sort of way if he can, but, it may be added, the chances are, if obtained, it will be

obtained in the wrong way. It is curious to trace how this is brought about; for instance, the sharp thin sound of the "cockney" dialect is the inevitable result of a forced power generated falsely. The constant noise of traffic compels in speech a sharp, clear sound, and, given the induced debility of adductor muscles, this is brought about by lessening the size of the passage above the organ of voice, thereby decreasing the volume, but by constriction gaining in power. And it may be noted that a sort of opposite to this is shown in the dialect of the "Black Country;" this dialect opens the sound, hence the credit of the Birmingham choir for "volume." Moreover, there is a class of men who seem especially to suffer from their attempts to create power falsely, so much so, that the result upon themselves has given the name of "the clergyman's sore throat" to the disease. Of course, all those who of necessity use the voice much thereby cause a greater flow of blood to the parts, and the parts being exposed, would be more liable to be affected by sudden change of temperature or by dampness than the parts of those not so speaking. But this of itself will not account for this disease, for it has been observed that those who can produce true tone do not suffer therefrom; the "better"-ness is the result of principle, not of practice, and one who starts falsely, only becomes more astray by his continuous false use. So far as this disease is concerned, the first prompting cause is the substitution of constriction at the fauces for the true obstruction at the cords. This vicarious power presents in its attainment the whole mucous membrane lining the parts above the larynx to a con-

stant irritating process, which, gradually producing a chronic inflammation, may extend downward to the organ of voice itself. This state of congestion owes its first germ solely to false vocal production; so that, as "prevention is better than cure," it would be well for the delegates of the Clarendon Press to fully convince themselves there is *every necessity* for seeking in the larynx itself the power of rightly creating tone. Dr. Morell Mackenzie calls the disease "the costermonger's sore throat," and he attributes it to prolonged efforts at an unnaturally high pitch. But this is not a true solution, for rightly trained singers sing higher than such persons, and with greater prolongation of sound, yet do not so suffer; then we are forced to adopt the truer explanation, the cause of this disease is force falsely sought, aggravated by height falsely formed.

Now, these are the attributes of voice in civilised man. We have (1) *tone* resulting from an intrinsic nature, which gives the *timbre*. This is a Universal Attribute. Then we have (2) *hue* resulting from a modification of the first, in degree, compulsory from forms of speech; in degree, volitional from mental desire; in part a Universal, in part a Particular attribute. Lastly, we have (3) *taint* resulting from idiosyncrasy of language pushed to extreme, or arising from direct efforts to produce results by false means. Some further curious philological propositions exist, but must be passed over. Mr. Plumtre, in his late lecture at King's College, speaking upon languages, remarked that the superior beauty of Italian or Spanish was attributed to the large quantity of vowels in them; but it would be more correct to assert

that the sonority observed in the speech of an Italian is owing to the "tonicity" having been retained, for vowels do not necessarily cause the tone, but they allow true vocal tone to grow simultaneous with, and correlative to, the growth of speech. In English, on the other hand, the induced weakness of the adductor muscles forces a compensating obstruction to grow with the growth of our words, so that, considered phonetically, the preponderating vowel sound in English is *e*; physically, smashed air in the mouth gives our Anglican hue.

However great a paradox it may seem, it remains true to all time, that the more beautiful a word as a sound, the more such word frustrates its true function by clinging as a pleasing sensation in transit, for so clinging, it does not use its full force to awaken or to evoke an idea; this is because the direction of thought, as embodied in spoken words, is always to hide or sink the material in the purely abstract spiritual. But when man speaks, the self-contained force conveyed by the "letter" is modified by an outer manifestation of "spirit," shown through other channels beside that of words. All liberty is dependent upon obedience; man's response to volition is ever restricted within a small compass, in one direction for his advancement, in another for his retrogression. Within this limitation he has freedom of action, and he may change the scale forward or backward, but under every condition the ultimate outlines are sternly defined. Being so, the effect produced by an actor influencing a recipient may be twofold—(1) acute, (2) massive; if the stimulus be in words alone as such, then it is "acute,"

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but to be effectual in such case, the recipient must be in his desire of advancement, in his power of advancement by past culture, and in his innate faculty, within the limitation which affords him contact with the actor's intelligence, or in other words, the actor and recipient must be nearly upon a par. Mr. Ruskin says the same thing when he says, no man can be rightly appreciated save by an equal or a superior; his inferior may under-rate him in ignorance or overrate him in enthusiasm; but he can only be known by the former. (I am not sure of the exact words, but that is the purport of them.) Mr. Sully, too, in his essay upon "The Basis of Musical Sensation," alludes to these different states of reception in his opening paragraph. As a state of approximate equality between an orator and his hearers cannot be assumed in large audiences, where numbers are concerned, a "massive" appeal is necessarily needed, the greatest force to the greatest number being the order of appeal. In song, and in a subtler sense in oratory, man is appealed to through *all* his powers of reception chronologically arranged, hence the power, and hence the charm. An orator, for one end, unites the forces found in Sensations, in Impressions, and in Ideas.

But there is a psychological and a metaphysical aspect of our subject which has been ignored both by teachers of elocution and teachers of song. Nerve force has a tendency to distribute itself over the whole circumference; it is, therefore, a sign of culture when a nerve-current is restricted to one set of muscles. Now, there are consensual movements, as in the case of the eyes, which cannot be decomposed; and there are associated movements

acquired by continuous use, which in some cases, for a true use of either set of muscles, require to be decomposed. These acquired associations are brought about by the following metaphysical law : Everything we do has a tendency to recur ; an act is easier the second time than the first, easier the third than the second, and so on ; finally, we eliminate consciousness, and hand the mode of doing the thing over to habit ; we have to think to do it otherwise. " A stream of conscious nervous energy, no matter how stimulated, causes a muscular contraction, a second stream plays upon another muscle ; and the fact that these currents flow together through the brain is sufficient to make a partial fusion of the two, which in time becomes a total fusion, so that one cannot be commenced without the other commencing also " ("The Senses and the Intellect," Bain) ; and the same principle goes on in the spiritual as in the material existence : thus, the brain works unconsciously in the direction in which it has been stimulated. This principle of unconscious cerebral activity has been amply dilated upon by Dr. Carpenter. What, then, do we learn ? We see clearly that by spoken words we have built up a force in our minds, and a force in our physical construction, each for evil, each of which has to be revoked and new phases of thought and action built up and made "secondarily automatic " before a man can venture to proclaim himself an orator. In other words, we must use our instrument in accordance with Nature's laws, and be able to play upon it simultaneously with, but independently of, spoken words. Whether it be oratory or song it is all one, the greater includes the less ; song is but an inferior

species of oratory, with an exaggerated force on rudimentary component parts. Here, then, is oratory presented in a tabular form.

Fundamental qualifications.	Of mind.	{ Developed intellect. Knowledge of language — the neutral ground, or mediant between actor and recipient. Retentive memory. Rhetoric. Logic.	
		{ Perfect control over the conveying medium, the organs of vocal utterance and articulate speech.	
Accessory qualifications.	Of manner. ...Action.		
	Of style.		
	Of delivery.	{ Power and softness— inflection. Modulation—cadence.	
	Of sense (sensuous).	{ Quality	{ Clearness. Smoothness. Volume. Intensity.

That tone is the basis of all vocal emotional expression is readily shown.

“Tones of voice betoken emotions which no words can express. Music is the most natural and direct expression of feeling that we have, whether it be joyous or otherwise. As a general rule, it is by sound we come into the closest contact with sentiment and motion of every kind” (“Introduction to Mental Philosophy,” by J. D. Morell, M.A., LL.D.). “There is a similar sublimity or beauty felt in particular notes or tones of the human voice. That such sounds are associated in our imaginations with the qualities of mind, of which they are in general expressive, and that they naturally produce in us the conception of these qualities, is a fact so obvious,

that there is no man who must not have observed it" (Archibald Alison, LL.D., on "Sublimity of the Natural World").

Tone is at least a direct presentation of a sensuous pleasure, but it can become more ; through it can be given a direct presentation of an inward natural beauty of soul which no words whatever can convey, whether in song or speech ; a control over the means of producing this tone is the first step, the first essential of good performance, for tone alone has the power to individualise the impersonality conveyed in a word.

— "Now, all right human song is the finished expression, by art, of the joy or grief of noble persons, for right causes. And accurately in proportion to the rightness of the cause, and purity of the emotion, is the possibility of the fine art" ("The Relation of Art to Morals," Sec. III., Oxford).

Daily increasing attention is being directed to this, and the questions before us are, who shall teach this thing? and how?

Dr. Ruskin, in his inaugural address, delivered at Oxford in 1870, said: "I think that general public feeling is tending to the admission that accomplished education must include not only full command of expression by language, but command of true musical sound by the voice." But hitherto the voice has been left to such professors of music as have chosen to assume the power of its culture, and the universally grotesque attempts to explain the phenomena of this most beautiful of instruments would tend to convince us that voice training is not their work, but is more the work of the surgeon ; a musician has to show the right use of a possessed power

in a specific direction through accepted methods of demonstration. We do not expect a pianist to be a wire-drawer, nor an arm-setter, neither need he be a voice-setter. But error culminated at its acme when a part of the musical profession drifted from what little truth was known into a meandering investigation of physiology. It is the physiologist's duty to explain the construction of parts; it is the surgeon's province to re-adjust parts mutually disarranged—to restore a disturbed relationship, but not necessarily to explain the physiology of the parts affected, and this surgical work always precedes the application of a power for a given end; finally, it is the voice trainer's duty to explain principles of re-adjustment. By invading a distinct and separate science the musician even lost sight of his professed work, which, as we have seen, was to explain how an instrument, not acting aright, can, under its then conditions, be brought to act aright, and ventured to tell us, and this invariably falsely, how the instrument works *irrespective of varying conditions*. The question is not so much how the thing acts, but how to get it to act so, when not so acting—purely a surgical question. Nature has created us so that when in health we do not feel we have parts; consciousness without sensation is a law; to feel we have a tooth is to have a tooth-ache. Actions acquired and rendered automatic are known to us through consciousness, never through feelings. So in song and speech, Nature tells us we only sing aright when consciousness alone informs us of the fact; if we “feel” we abuse the laws of our construction by erroneous use.

Before pointing out the fast disappearing vital principle

of true training, and corroborating its truth by incontrovertible finality in scientific research, the actual state of present knowledge (or ignorance) of voice production shall be shown. There has been no recognised school of oratory since the antique, so we can only extract information affecting oratory from the past and present schools of song. During the last ten years more random writing and still randomer talk have taken place upon the question of the voice than all the past experience of bygone years can show, yet history tells us that by uniform superiority in results a method of training *did* once exist, that so far as it went was true, in at least one first principle, and history tells us now, that by uniform failure in results a show has been substituted for a method. Of a hundred notes of equal pitch one alone shall be right, and ninety and nine wrong, yet these ninety and nine, by means of looking-glass and lime-light, may be exhibited to an ignorant and applauding crowd, public trust betrayed, the science of physiology degraded to the level of a butcher's shop, truth hidden, and yet not one single attempt to tell medical or scientific men the difference between right and wrong in this matter, leaving the public in the graceful position of a man with a broken leg whose medical attendant, after giving a dissertation on the relative positions of the tibia and the fibula, with carefully prepared diagrams of the parts, and a model after life, forgets or does not know how to put on the splints, and leaves his man a cripple. Then, what Professor Elsberg said in the *English Mechanic and World of Science*, November 21st, 1873, is not true; it is the exact opposite of what is true; people neither

understand the voice "thoroughly" nor "fully;" they do not understand it at all. He said:—

"At the present day the mechanism of the voice is no longer a mystery. We understand it thoroughly and fully, and this we owe principally to the introduction, about fifteen years ago, of an instrument by which we can watch the whole mechanism in living working order—the employment of which has been authoritatively pronounced the most important improvement recently made in practical medicine, the instrument by means of which, more than once, has been effected the miracle of making the deaf to hear and the dumb to speak."

Dissection had told us all about the vocal organs before this useful instrument was so foully misapplied; nor has its invention added one grain to the permanent store of human knowledge only so far as pathological matters are concerned; while, on the other hand, the one little truth that was known to voice trainers before they had ventured to rob surgery of this mechanical assistance has become entirely corrupted by the laryngoscopically-aided thought of the pseudo-scientific German School, backed by the thoughtless support of Dr. H. Helmholtz and Professor E. du Bois-Reymond. Then it is time the members of the medical profession took this thing out of the hands of those who misapply it, and to prevent further mischief, undertook themselves their work by right—that of voice trainers.

Now, let it be observed, the study of the voice is not like the study of an instrument detached from man; in this latter, everyone commences equally incapable of the desired control, but in voice a partial control may actually

exist. In some cases students, having accidentally retained or dropped into the method of true vocal emission, have learned singing from musicians, and by the thoughtless public the master has been unjustly accredited with the result of the voice beyond its specific musical training. In order to sustain such reputation, these mistaken men have published treatises containing visionary and imaginative theories on the voice, purely hypothetical, which accounts for the numerous theories conflicting; nor had the few men who taught truth the power to prove, on scientific grounds, the correctness of their teaching and the fallacies of their opponents; so now, in the year 1874, midst all the talk and all the printed works on vocal art, we find but one book that instructs the first step to after excellence, which step it is our duty to rescue from surrounding error.

Voice production affects the pulpit, the platform, the forum, and the stage, and the principles of restoration should be known to every national school-teacher throughout the kingdom, and especially should they be known to every medical practitioner. It is said "prevention is better than cure;" by true use of voice chest disease could, in many who have its tendency, be successfully warded off, this because a greater consumption of carbon takes place, quickening circulation and hastening digestion, so that true speakers and singers feel only hunger after work. Purely as a question of health the voice should be cultivated collaterally with the culture of words, both spoken words and vocal tone should grow up together, but each power should be taught in its specific

mode.* While medical men have often recommended the healthful exercise of song, they have never made their word of worth by troubling to go deeper into the question and deciding what work is right work, what wrong; this they should now do. But in a degree attention has been drawn by outsiders to this, and singing, under the generic term "music," has been introduced into our national training schools; unfortunately, the two methods in use, Mr. Hullah's and Mr. Curwen's,† are worse than useless, for while professing to teach "music," these methods destroy in more rapid degree than spoken words the true conditions imposed by Nature for producing vocal tone. The little differences between these two men science does not trouble itself with: with them it is a question which of two false methods shall be foisted

* The only position regarding the voice tenable by a musician as such, compatible with honesty, is that of beginning training from earliest years of life, for such position is based upon a principle of Conservation instead of Restoration: it is strange that only one musician (Mrs. Weldon) has seen this, and tried to establish voice culture upon such principle.

† I publicly challenged, in the *Musical Standard*, Jan. 11, 1873, these two men, and charged them with having falsely defined the first principle of voice training, but they lacked either the courage to defend or the honesty to retract their statements. I may be wrong, but it appears to me that an open challenge cannot be ignored, and when a man of known position publicly charges others with having falsely defined an elementary principle of art, and that a principle which misunderstood must in every case result in abject failure, I say such men challenged are bound to answer, and I believe that the common sense of the public will ratify my opinion.—C. L.

upon the public as true ; with us it is a question solely of what *is* true.

We proceed to examine such teachers as we have. These may be divided into two classes ; firstly, those who enforce vocal utterance and articulation together (Sol-Faing) ; and, secondly, those who train the organ of voice separately. Of the first class we may say, if it be true, as alleged by Mr. Hullah in his reports to the Lords of the Committee of Council on Education, "that the association of a given syllable with a given sound," as "a help to the beginner in vocal music is admitted in almost every existing system of teaching," it must be equally true that the propagators of "almost every existing system" are ignorant of the simplest laws of the human mind, for any rudimentary work on psychology will disprove them ; nor can they get one logician to support them. But it is not true ; a beginner is impeded, not helped, by the association of sound with syllable. Much strength has been given to this false method of procedure by the opinion of the late Sir John Herschel ; he wrote in the *Quarterly Review* to the effect that he supported the "movable Do," and considered the "fixed Do" as a retrogressive movement in teaching song. It is a strange thing that whenever we get a great man we at once set to work to extort from him an opinion on something or other in which he is not great. Sir John did not know, nor could he be expected to know, that the association of words with vocal utterance is the common cause of weakness, incapacity, and distortion !. Still, his error is not so mischievous as teachers cause it to be ; he advocated that a word or syllable should.

“represent” a given sound, and that is a vastly different thing to its being made a means of presenting one. To expose the fallacy: the first thing logically done in order to generate in a person a perception of a difference is to remove all differences but the one required to be perceived, for thus no extraneous contrasts distract the observer’s attention from the required point. An uttered word or syllable received by a listener for the first time appeals to him solely as a new sensation, and in his mind is unconnected with other perceptions; the sound expresses nothing, it evokes nothing; it is a noise pure and simple, and can never stand as a symbol of another thing unless a perception of that thing be possessed and association has taken place in the mind between the two perceptions, the noise and the thing. The ultimate test of discernment is shown in a person’s subtlety of perception—that is, in his seeing minuteness of gradation either in sound or colour; but, in order to evoke first perceptions in sound, it is necessary to take for beginners, even for strengthening speech, some broad differences, hence music* is rightly used as the simplest means of voice training. This involves a definition: music is accepted pleasur-

* Mr. Sedley Taylor, in his work on “Sound and Music,” rightly advocates for guide the use of a piano tuned to perfect temperament. However strange this may seem, it is the proper course, for it is not true, as Mr. Macfarren asserts in his six lectures “On Harmony,” p. 141, that the ear “corrects” the defect found in the tempered scale. What Mr. Macfarren calls correction is really corruption, for a recurrent presentation of a fictitious thing does not cause our natures to change that thing, but, on the contrary, causes our natures to be everlastingly changed by it: hence our paucity of modern composers.

able disjuncted sounds relatively arranged in simultaneous or successive order. Now, the perception of an interval or distance between two sounds is either possessed or it is not; if a person has it, he does not want to learn it; if he has it not, no uttering of syllables can evoke it, for the two perceptions have not been associated, so do not cohere: We cannot awaken what has never slumbered. A word, then, always follows, never precedes the perception of the thing for which it stands; so it may be affirmed both "movable" and "immovable" words *impede* the desired discernment of difference between two sounds of different pitch by bringing in other extraneous and confusing differences not required to be perceived. A man can readily identify the pitch of a note when sounded in a familiar voice, but "on a strange instrument it is less easy to make out the identity, the change of quality in the note, the greater or less emphasis, the different duration of the sound—as in comparing the piano with an organ—all tend to *disguise* the pitch and to render a more delicate or a more cultivated ear necessary for its discernment."—(Bain.) The position, then, of modern musical intelligence, so far as song is concerned, is this: The association of words with vocal tone by long uses fuses together two or more sets of nerve-currents flowing simultaneously through the brain, which currents mutually influence each other to the hindrance of a required simple perception; next, a particular association is wilfully induced under the garb of culture, by joining set syllables to given sounds. This association has afterwards, by long practice, to be decomposed, in order that ever-varying and different words may be used with similar distances in sound—in brief, people

virtually start with an induced error and pay to add a fresh one. "For every act of memory, every exercise of bodily aptitude, every habit, recollection, train of ideas, there is a specific grouping, or co-ordination, of sensations and movements, by virtue of specific growths in the cell-junctions." * Being so, right work consists in going back to first principles, as shown in infant life, and starting with complete isolation from all collateral issues. This brings us to a consideration of the second class of teachers—namely, those who train the instrument of voice apart from musical expression or word adjustment; here we naturally drift to the old school of song, as presented to us by S. Garcia. And this is his receipt for first start in study: "Keep the tongue relaxed and motionless, avert the base of the pillars, and render the whole throat supple." (Better have said, breathe through the open mouth but feel no parts). "In this position breathe slowly and long. After being thus prepared, without stiffening either the larynx or any other part of the body, calmly and with ease attack the tones very nearly by a slight motion of the glottis on the vowel A, very clear; this motion of the glottis is to be prepared by closing it, which momentarily arrests and accumulates the air in this passage; then, as suddenly as the pulling of a trigger, it must be opened by a loud and vigorous shock, like the action of the lips energetically pronouncing the letter P." And he adds, "This first lesson should be insisted on, as it is the *basis* of all teaching. I again recommend the shock of the glottis as the *only* means of attaining the

* "Mind and Body; the Theories of their Relations."

sounds purely and without bungling." Now this, small though it be, is the only principle of training that has ever been known successful in results ; by it great singers have been made, without it, many possessing all other requirements have failed, and it served its purpose before the introduction of the laryngoscope. We have to see what this "shock of glottis" is ; why it restores the instrument to its natural conditions for creating sound ; and how Nature acts when rightly used. But before this we will trace the perversion of S. Garcia's method. Madame Seiler, Dr. Helmholtz's *protégé*, determined to outdo S. Garcia, so published a work in which she charges him with having "attached special importance to much that is unessential and abnormal," while "the main facts, the elucidation of which is particularly needed, he has scarcely mentioned." This work of Madame Seiler's is now the generally accepted authority in England, America, and Germany.* Many of this lady's German adherents have invaded other countries and have propagated her views, amongst whom may be mentioned the lecturer at University College, January 30, 1873, and the acceptance unchallenged by the members of the medical profession of what was then stated seemed to settle the matter for ever. There are, however, some curious discrepancies ; in the *Tonic Sol-Fa Reporter*, June 15, 1872, appeared a report of a paper read by Herr Behnke, in which the following passage occurs :—

"Signor Garcia's experiments have been repeated with even much greater success than he attained, by a German

* It is to be regretted that "The Voice in Singing" was written by a lady ; but falsehood has no sex.

lady, Mrs. Seiler, so that, thanks to these investigations, we have now done with theories, and are able to settle the much vexed question about the registers of the human voice without the shadow of a doubt."

And in the same paper for January 15, 1873, it is stated that Mr. Behnke noticed "some discrepancies between his own observations and some statements in Mrs. Seiler's 'Voice in Singing,' in which he showed that she had followed Garcia too implicitly. . . . *These discrepancies, however, made no difference in the practice of voice training as recommended by Mrs. Seiler and by Mr. Curwen.*

Thus, we see the lecturer of January 30 stands pledged in all material points to the teaching of Madame Seiler; we will see how she understands and explains first principles; she says, pp. 121, 122: "In the very first lesson I teach my pupils the motions of the vocal organ in trills, and if they do not learn them by imitation I give them simple exercises on the syllable *Koo*. . . . When pupils have become accustomed, by rapidly singing the syllable *Koo* on each tone of the trill, to the movement of the larynx, then they can practise upon another syllable." (The omitted passage does not affect the statement). And Mr. Curwen, under the tutelage of Herr Behnke, has printed in his "Standard Course," as an exposition of this first step in voice training, as follows: "When Garcia and other voice trainers speak of the 'shock of the glottis,' and when Dr. Rush, Mr. Melville Bell, and other elocutionists speak of the clear 'explosion' of vocal sounds, they refer to the firm closing, followed by the distinct opening of these lips of

the larynx. The action of the lips of the mouth in pronouncing strongly the letter *p* in *papa* will illustrate this; and the 'shock of the glottis' may be felt in a slight cough, or in pronouncing clearly the letter *g*, as in *game*, or *k*, as in *keep*. . . . The work *Shaalau* (Scala) which many voice trainers use for their exercises, has this advantage, that its first syllable *necessitates* that clearly marked 'explosion' of the vowel of which we speak." This is the teaching of the leader of a system who boasts on his own calculation that the number of pupils learning his method annually is 315,000. It is a curious doctrine to teach that a consonant uttered forcibly necessitates a clearly marked explosion of a vowel emanating from a different part; but passing that, we may trace how this error has arisen.* At page 9 of S. Garcia's work he writes: "This motion of the gullet resembles also the action of the vault of the palate articulating the motion expressed by the letter *K*." Here we find the whole solution: The gullet is the œsophagus about where *X*, *K*, *Q*, and hard *G* are made, and S. Garcia, knowing full well what he meant, misapplied the word "gullet;" but Madame Seiler, not knowing what he meant, took the word in its literal sense, and so just fell into the very trap which would naturally present itself to an ignorant person on reading Garcia's work. In dismissing this mischievous work of Madame Seiler's it is to be observed that the support of great men becomes an almost criminal

* In a case of congenital deformity submitted to me, it was found that the patient could not produce any faucial explosives (*X*, *K*, *Q*); these all became aspirates; but full and true tone could be produced from the cords.

act when such men venture to give opinions upon questions of which they know nothing: error in ignorance may be pardoned; in mediocrity condoned; but a great man who lends his name to advertise and support assumptions the fallacies of which a child might perceive cannot be forgiven.

To proceed to a true explanation of the vocal phenomena. What Dr. Wyllie stated as the result of his experiments upon the detached larynx holds with equal force in the living subject; if, as he has proved to be the case, the strength of such comparatively minute structures as the intrinsic muscles of the larynx which close the rima be insufficient of itself to withstand the automatic thoracic force brought to bear upon the true cords, it must be equally true that these muscles cannot of themselves supply sufficient resistance to overcome the force of air when producing vocal tone; therefore, there must be an inverse force removing the strain, for if there be not, the air acting upon the vocal cords from below will wedge them out of their parallel lines, not by their intrinsic elasticity yielding to pressure, but by the attracting power which brings them together giving way; the cords would, in fact, be forced to resume in degree their state of repose, presenting a fissure of an isosceles triangular form, a form incompatible with the production of true musical sound. This balance of forces presents a subtle question of hydrodynamics. There is the perpendicular balance between the diaphragm and the larynx, and there is the horizontal balance between the permanent and the temporary point of impact of the cords: the first is dependent upon the second, and the second is dependent upon the first. We

know that the contraction of any muscle demands two fixed points of resistance at its extremities, and if one of these break loose the force of contraction has nothing to expend itself upon, and thus a false position is incurred. In false emission, as induced by spoken words, the ventricles are *not* inflated; thus, the adductor muscles have to bear the brunt of the whole thoracic pressure, and being of themselves too feeble to resist, of course succumb, and that is the sole reason of all feebleness and incapacity. So that Dr. Wyllie's discovery of the use of the false cords and the ventricles just amounts to this: It proves that Nature has ordained compensating forces, under which condition the minute muscles of the larynx can accurately act, but that under less favourable conditions these muscles can only partially fulfil the functions for which they are destined; this is in strict conformity with Nature's universal principle of "least action" (*see* Rev. Dr. Haughton on "Animal Mechanics"). In true song or speech the work of counterbalancing different degrees of pressure from below is done by the air being inverted, and forming an eddy in the ventricles. This is proved (1) by the fact that under the conditions of true sound the ventricles can be felt to be puffed out, while with false sound they are not so felt; this accounts for the breadth of larynx in public singers; (2), a true vocalist does not feel as though he were forcing air out, but as though he were actually drawing breath in, and this even when emitting the most powerful sound; in false emission it is not so; the point of resistance breaking loose makes him feel as though he were running after a note to catch it; (3), a true vocalist *knows* but does not *feel* he is singing; consciousness is

the sole guide ; (4), under such conditions the sound can be sustained at full force a considerable time, showing the economy of Nature ; and the sound can be increased inversely to the quantity of air held in the reservoir below, this, too, without studying the *crescendo* and *diminuendo*. Power, beauty, ease, and endurance are four different aspects resulting from the same state of tonicity. But in false song or false speech the instrument of music is only used to partially catch the air in transit, and owing to this artificial mode of use it cannot resist the full thoracic force.

The physical difference between right and wrong production explained, we naturally proceed to explain

THE METHOD OF TEACHING.

By holding the breath the ventricles of Morgagni become inflated ; the air catching in them causes the larynx to rise, and tightly closes the apertures ; by ceasing to will to hold an explosion of the condensed air takes place. Virtually, this last explosion is nothing more nor less than the first cry as presented by infant life, and is practically the same as what was called "le coup de glotte," as Garcia translates it, "the shock of glottis ;" but it is not a shock of glottis at all ; it is an audible result arising from the false cords releasing condensed air imprisoned below them, which air in its release explodes. The Second Axiom of true teaching is, therefore, the Valvular Action. Now, either the false and true cords may act in friendly consort alternating between approximation and disjunction, like scissors, as in laughter, or the false cords alone may separate, assuming a fixed ellipsis, while the true cords, by their

natural elasticity, may alternate between parallel lines and ellipses; the first is the condition for false production, the second for true. This first step of voice restoration is only an application of the automatic action that takes place at birth, and an application of this can alone enable a speaker to utter loudly any word beginning with a vowel; continuity of tone naturally results from retaining by an act of volition the conditions assumed in the onset by Nature. To strengthen weakness we use muscles at full flexion: Then, the Third and last Axiom of training is Equal and Full Power—full power to strengthen debilitated muscles, equal power to ensure no change of state in the relationship of the parts each to the other. The whole gist of study may be summed up thus: Hold the breath on deep inflation; by ceasing to will to hold Nature sets the instrument in accurate action; let the involuntary contractile pressure continue the sound, and by repeated use in such manner the instrument will in time become automatic—a servant to our wills instead of a tyrant crippling and frustrating our desires. It is strange that, exactly at the same time German assumption was doing its uttermost to destroy the little known in voice training, a medical man should be making experiments in Edinburgh which ultimately resulted in the greatest scientific discovery affecting the science of voice production that has ever been put before the public, and which discovery conclusively supports, from a scientific point of view, the teaching of the ancient school of song. Dr. Wyllie's explanation of the use of the false cords and the ventricles gives the true solution to the right use of voice, the air in the ventricles acting somewhat analogous

to the air which a trumpet-player imprisons in his cheeks ; the greater reservoir of air keeps the lesser one always full, and the control of measured force from the greater is dependent upon the fulness of the less, this simply owing to the distribution of nerves. Now, no man can speak or sing with perfect self-possession and accurate response to will unless he has masterful control over the respiratory apparatus, and no man can have this control unless his organ of voice be rightly used.

There remains to be shown the best mode of self-study, and the influence of second causes upon pitch, so that the student may know what difference in hue to accept as true and what to reject as false ; this because compass is as much a means of oratorical effect as it is of song. The best starting point for study is the note produced by sole approximation of cords, wind and reed synchronising, for in this the conditions both of elevation and depression of pitch are not involved ; the note produced from the detached larynx by imitating the action of the adductor muscle would give the easiest sound in the living subject ; this, in the average adult, male or female, is middle G, and in strange corroboration, we find G accepted long ago by priests as the most convenient note upon which to recite words. Having fixed the station note of equally sustained tone and of unflagging strength, all notes below are made by the larynx sinking and the attendant relaxation of the cords ; from the detached larynx, male and female, Dr. Wyllie produced an octave below the station note ; a like octave can be produced from the living subject. For the notes above G the larynx rises, and in rising causes increased tension of

cords and a correspondent elevation of pitch. In this ascent the thyroid and cricoid rotate upon an eccentric centre, causing the planes of both false and true cords to become with each heightened tone more diagonal, thus, the sound, travelling at a right angle to these planes, finds its point of impact on the arch of the palate more and more forward with each ascending sound. A change in hue arising solely from change of direction has been a great source of error in our teachers, who, when speaking of "registers," have been invariably misled by this. The object Nature evidently has in directing tone is that with equally developed force vocal utterance and articulate speech can be simultaneously used without one influencing for evil the other. This affords another proof of the superiority of the fast dying old school which insisted upon a "forward production" as a basis for song; and the reason why the larynx does not assume its right elevation for higher notes than the station note is because during our past years it has only been used *indirectly* to strengthen spoken words, so that a tendency has grown up in the larynx to assume and retain the average altitude of language and to leave the production of all notes of greater height than the average to volitional force acting through the thoracic muscles alone. Most untaught persons, therefore, produce sounds above the station note by excess of blast, as seen by the rapid exhaustion of air, as heard by the point of impact being far back in the mouth, and as felt by the larynx being low, and finally corroborated by a feeling of personal fatigue when such notes are given forth. The corrective study is not, as alleged by Madame Seiler, "uttering *ah* in connection with consonants

coming rapidly, as in *pfa*, *bfa*," for, as before remarked, a noise generated elsewhere cannot assist the organ of voice in directing its own tones; but the corrective study is, as the truer teaching of Garcia shows, having recourse to a steady spring from the larynx; this, by practice, induces in it a habit of rising until a position of highest elevation is fixed. It may be added, experience of years of voice training shows that about C is found the best place for fixing the first central tone, and from this working downward to G inclusive. A curious phenomenon occurs about D or E: if the larynx ascends above this point the sound is propelled directly out of the mouth without any reflection on the arch—thus, a shout or noise results. No doubt this is the production spoken of by Dr. Maekenzie as of "too high a pitch."

This, then, is the natural law; as soon as the sound obtains *no* reflection the scale must be continued by letting the larynx *sink* and going over the preceding five notes, G to D, with greater pressure, thereby elevating them a fifth (full harmonics). The descent of the larynx about high E can be felt with the finger. All these notes above D are producible in more ways than one, but all depend upon a correct emission of the tones below, so that the old teachers were right in insisting on fixing middle and low notes, although they did not know the reason why this should be done. In *soprani sfogati*, *tenori robusti*, and in all low voices of either sex, the notes above D are full harmonics produced by increased blast acting upon the cords fixed for a fifth below; but in "light" voices the notes above D are harmonics on a "node" from the cords fixed for an octave and some for a twelfth below. By

emitting a deadened high note (falsetto) and pressing above the thyroid with finger and thumb the sound will suddenly burst out in a bright clear tone; this is the production sought for by light singers. In the living subject there are three series of tones: one set produced by relaxation, one set by tension, one by reproduction; and the physical facts producing these three series are made manifest to man through created sound by three entirely natural but different hues. We know that air confined in spaces will strengthen and re-enforce sound (Mr. Sully in his admirable essays calls this "co-vibration"); in a human body there are three caverns filled with air that influence tone—the chest, the pharynx, and the mouth—and that cavern which of the three exercises the preponderating influence in tinging tone has hitherto been used to give a name to that series of sounds so tinged; thus we have one set of sounds termed "chest," and another "head." Moreover, with an increasing current of air from below, the sound is carried by the current in one direction and impeded in a contrary one. As all these second causes are absent during observations on the detached larynx, and as all remarks in medical works are drawn from this latter aspect of observance, we naturally find men of science writing of the "register" of voice (2 octaves), while musicians approaching from a different point have confusedly brought in all second causes, and so speak of the "registers" of voice; hence the discrepancy in the statements of the two classes of men. The sudden change of hue in the female voice between middle F and G takes place just the same in the male voice, an octave lower, but owing to the difference in thoracic form the

resonance continues in the chest of man where it ceases in that of women ; the ignorance of this physical fact is the cause of much false teaching, and has entirely blinded all previous writers.

It will be well here to clear away a false statement of the physiological action which takes place in producing "chest" notes. Herr Behnke, as reported by the *Lancet*, said at King's College : "The chest voice, which is the lowest, was said to consist of two portions, the lower and the upper. In singing in the lower register, the vocal cords are approximated for nearly the whole of their extent, but a small aperture remains between the arytenoid cartilages, and by the passage of air between them the cords are thrown into a full loose vibration." But Dr. Prosser James, in his articles on "Diseases of the Throat,"* reproduced some observations on lost voice which strangely conflict with the foregoing ; speaking of the patient, one article continues : "This (*i.e.*, loss of voice) was at once explained by the laryngoscopic examination, which showed that there was not the slightest approximation of the vocal cords on attempting to speak, and the glottis remaining widely open, a large volume of air was required to be forced through it in order to produce even the faint whisper above mentioned. This demanded an effort of the expiratory muscles which was very fatiguing. The larynx appeared in every way healthy." And further on it stated that after an application of electricity "the voice had become very much louder, so that it could be heard the length of a large

* *Medical Press and Circular.*

room, and the patient no longer complained of fatigue even after a long conversation. But at this point the improvement rested. On attempting phonation there still remained *a triangular opening in the glottis posteriorly, showing that the arytenoideus failed to act.*" (The italics are mine.)

Here we see that what Herr Behnke advocated as a natural law Dr. Prosser James advanced to prove paralysis, and the case brought forward by Dr. James solely illustrates in excess the direction of error daily being induced by words.

Further, it is assumed by voice trainers that because there is a difference of hue between one series of sounds and another series of sounds that Nature causes a "break" in the voice, which break has to be "bridged over" (see any vocal tutor). But a difference does not necessarily involve a defect; so what is ignorantly termed a "break" may with better judgment be termed a "joint." A break is a bungle of ignorance, and the use of the term by the musical profession is giving to airy nothings a local habitation and a name to deceive the public and allure the unwary; the term itself is based on the assumption that Nature habitually creates man a cripple, and thus teachers complacently proceed to destroy a natural diversity in hue under a pretext of covering an imaginary gap. The hue with which each register is coloured, and which men try to annihilate, is given by Nature for a definite purpose, and is entirely right. This brings us to the science of æsthetics, which science is broadly divisible into that which stimulates, which may be called Motion, and that which depresses, and which may be called

Repose. Power will excite, softness will tranquillise ; so with height, and the opposite, depth ; and with quickness, and its opposite, slowness.

<i>Motion.</i>	<i>Repose.</i>
Power.	Softness.
Height.	Depth.
Quickness.	Slowness.

The contradictories of any one of the above terms are found in the correlatives to the accompanying other two ; thus, the stimulus derived from height can be counter-balanced by slowness and softness ; but in the voice, wherever we require an outer manifestation of constant excitement, Nature has strengthened her æsthetic law by fixing a hue which expresses that mental state irrespective of the words associated therewith ; and wherever we require an outer manifestation of constant repose Nature in like manner has fixed a corresponding hue. These are immutable results arising from an affinity between the receptive faculty and the intrinsic properties of the instrument. But where all kinds of expression are shown, that is, in the ordinary colloquial compass, the tone is a negative one. Probably this physiologico-æsthetic fact, taken in connection with Dr. Wollaston's discovery of the *susurrus* of muscle, and the additions to this by Dr. Haughton, of Dublin, and Dr. Collougue, of Paris, may give the scientific basis for the solution of the much vexed question of "pitch."

Voice training was originally the work of past great

singers, who taught by imitation ; of late years this work has been added as an inferior adjunct to teaching the piano, the result being that we occasionally get a half-taught singer, who is carefully exhibited at great cost on festive occasions, and caused to sing at us, while we for the most part remain a nation of dumb mutes ; thus, the public have got to look upon a beautiful voice as a freak of Nature, or a beautiful monstrosity, instead of being, as it is, a common gift of God to all, implanted in each of us for solace in sorrow, enjoyment in leisure, and spur in work. The difference, then, between the present essay and the faultful suppositions propagated in accepted vocal works is this : each of the existing works is started on the premiss that the writer is great and Nature poor and small, while this work assumes man's littleness and Nature's greatness, and asserts that men are better employed in perceiving a true thing than they are in conceiving a false one ; to this end the economy of Nature has been shown, the gradual decline of tone through lost relativity has been traced, together with the introduction of spurious vicarious force, and the injurious association of nerve-currents by use of spoken words. The modes of restoration and readjustment by decomposition of nerve-currents and the severance of vocal tone from articulate speech have been pointed out, going back in all simplicity to first principles as shown in child-life ; and, finally, the gradual development by steady right directed work has been enforced. We have seen how conflicting opinions have arisen, and how these and observations from different aspects can be explained, and, where each in its way correct, made to agree, and we have seen how science has been retarded by

voice culture having got into the hands of a wrong set of men. Of course, a true teacher of music would see the immense advantage that must accrue to his profession if voice trainers had a separate sphere of action, and could hand over their work, saying, "Here you have a perfect voice, implicitly obedient to the will of the possessor; it is developed to its uttermost, and refined to the greatest extent that work, aided by science, can attain. Now teach the possessor of such voice to use it with the consummate skill that you, as musician, know best how to impart, then we may by our friendly association of work, and in due time, produce a real artist—not a singer of the debased modern school." But, instead of that, it is generally assumed that the most difficult branch of all musical training—that of guiding an invisible instrument—is quite an easy matter, requiring no power on the part of the teacher to command any "utterance of harmony" from it himself, nor any skill on his part! Are man's nerves and muscles easier to be played upon than tempered scales and ivory keys? It is not so, and only because custom sanctions the mode is the fallacy obscured and the ignorance condoned—for Ignorance is the mother of stupidity, and Custom the father of fraud.

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